

Status of the FAIR project

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The international FAIR project at GSI aims for an unprecedented facility for research with stable and radioactive ion and anti-proton beams. It will comprise of ion beam accelerators, storage rings, an anti-proton source, a fragment separator and experimental set-ups for four research pillars. These pillars are organized in large collaborations involving almost 3000 scientists: APPA for atomic and plasma physics, biology and material science, CBM for studies of compressed baryonic matter, NUSTAR for nuclear structure, reactions and astrophysics investigations, and PANDA for anti-proton studies. After a reorganisation in 2015, the FAIR project is progressing vigorously. Construction of the buildings and production of the machine and experiment components are on-going. Moreover, a scientific phase-0 program with the upgraded GSI accelerators and the already available FAIR sub-systems, e.g. the many NUSTAR set-ups has started.

NUSTAR relies primarily on the availability of exotic rare isotope beams produced by fragmentation reactions and fission of relativistic heavy ions. The fragment separator FRS and a versatile set of instruments, including gamma arrays, particle spectrometers and a storage ring enable unique experiments at GSI. The Super-FRS at the FAIR facility will provide several orders of magnitude stronger beams, enabling access to the extremes of nuclear stability. Continuous R&D efforts result in improved detectors and enable the NUSTAR collaboration to steadily enhance the sensitivity and selectivity limit of their experiments. Beyond providing new insights into the nature of atomic nuclei and their creation in the universe, important technological applications for the benefit of our society arise from NUSTAR developments.

The status of FAIR and NUSTAR will be reported, the opportunities for NUSTAR experiments in FAIR phase-0 at GSI and at Day-1 at FAIR will be discussed, and novel applications will be introduced.